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October 20, 2004

Butte-Silver Bow Health Dept.
Attn: Mr. Rick Larson
Butte-Silver Bow Courthouse
Butte, MT 59701

Subject: Groundwater Quality Assessment
West Butte ~~Big~~ Butte Property
Butte, Montana

Dear Mr. Larson:

This letter discusses the results of a groundwater assessment of the Big Butte Property. The property is located in Sections 14, 15, and 16, Township 3 North, Range 8 West, Silver-Bow County, Montana. This property is located within the West Side Operable Unit. Very little characterization or investigation activities have been conducted to determine the extent or magnitude of surface water or ground water impacts beneath the property.

SCOPE OF WORK

The purpose of this work was to assess surface and ground water resources and determine risks or liability associated with that affects of historic mining practices on the property.

DATA REVIEW

Available groundwater data for the site property is limited to samples collected from the abandoned Orphan Boy Mine located in the west half of Section 14 and a seep located in the southeast quarter of Section 15. Two seeps have historically been sampled near a small body of water named Green Lake. The original Green Lake Seep lost flow, while the current monitored seep located at the base of a tailings pile began flowing. According to Mr. Ted Duaime of the Montana Bureau of Mines and Geology (MBMG), the seep is thought to be a drain for the Orphan Boy mine. Evidence of this is the stable nature of groundwater levels in the mine, while flow from the seep fluctuates from approximately 6 gallons per minute (gpm) up to 30 gpm.

The Orphan Boy mine is part of the mining complex known as the Outer Camp Mines, which includes the Orphan Girl Mine at the World Museum of Mining. The Outer Camp Mines includes a number of underground works ranging in depth from the surface to depths of approximately 4,000 feet. As such, the Orphan Boy Mine samples may be representative of varying aquifers of varying water quality.

Analytical samples have been collected by MBMG and ARCO as part of the ongoing mine flooding monitoring studies in the area. Samples have been collected from the Orphan Boy Mine and the Green Lake Seep sporadically for approximately 15 years. The Orphan Boy Mine is no longer sampled by MBMG due to safety concerns around the unstable entry. Analytical results available for these sites and nearby wells to the east are presented in Table 1.

In order to assess any affects of mine activity at the Big Butte property, a broader search was conducted of the MBMG Ground Water Information Center database for additional water quality data for the site and surrounding properties. The results of the search did not identify any additional wells or monitoring points within the study area. However, water wells with water quality information were identified north and west of the site and east of the site at Montana Tech and within the City of Butte.

The Montana Tech well, Tech-1 and the Butte City Supply well are located approximately 1,000 and 2500 feet east of the Orphan Boy Mine respectively. Completion details and monitoring information was not available for the Butte Supply well. The Montana Tech well Tech-1 has been monitored extensively and has been sample for water quality. Hydrographs for depth to groundwater measurements at Tech-1 and the Orphan Boy mine are nearly identical for the corresponding periods of monitoring. As a result, Tech-1 and the mine appear to be hydrologically connected.

Comparison of analytical results from the Orphan Boy mine and Green Lake Seep to Tech-1 identifies elevated concentrations of manganese, sulfate and cadmium in both the Orphan Boy and the Seep. In addition, arsenic is elevated in the Orphan Boy and historically, lead and copper are elevated in the seep. However, with the exception of arsenic in the mine, concentrations of these elements rarely exceed the established Environmental Protection Agency (EPA) maximum contaminant levels.

In addition to the Tech-1 and Butte Supply wells, two sample locations were identified in Section 10 to the north and two in Section 16 to the west of the site. The wells to the north are identified as domestic use. The wells in Section 16 are located in the Silver Bow Creek valley bottom and consist of a public supply wells for Town Pump and a residential well, each located in Rocker, Montana. Each of the samples from the surrounding property identified elevated concentrations of arsenic at or above Environmental Protection Agency (EPA) maximum contaminant levels (MCLs).

CONCLUSIONS

Based on the review of the available data, mining activities within the Big Butte Property have affected the water quality of groundwater and surface water discharges in the vicinity of the Orphan Boy Mine. However, due to the limited available data, for the Big Butte Property overall, an accurate assessment of the water quality is not possible.

It is the opinion of WET that any future planning for the property with regards to water production or usage would require investigation to determine water quality prior to any development. We would expect that some areas of the property would have acceptable water quality for low yield (<20 gpm) uses.

The limited available data set indicates that ground water quality and surface water quality has been impacted. Insufficient data exists to define the extent and magnitude of these impacts with any reasonable degree of confidence.

Water & Environmental Technologies, LLC hereby certifies that the information and findings in this report are as described in this document. All statements made herein are true to the best of its knowledge. No expressed or implied warranties, including but not limited to any as to the accuracy of the information obtained, are made. All warranties are expressly disclaimed. We appreciate the opportunity to work with you on this project and serve your environmental consulting needs.

Respectfully submitted,

Water & Environmental Technologies, LLC

David J. Erickson, PG
President/Hydrogeologist

Patrick J. Thomson, PG
Hydrogeologist

Attachments:

ATTACHMENT A

BIG BUTTE PROPERTY
Historic Mine Prospect Area
Groundwater Inorganic Chemistry Regulatory Exceedances
All Concentrations in micrograms per liter

Sample Site		Date	Fe	Mn	SO_4	Al	As	Cd	Cu	Pb
Orphan Boy T3N, R8W, S14, BCDC	D	5/28/87	250	8,840	702000	<30	**90**	<2	12	<40
	D	6/25/87	270	8,180	NR	<30	**18**	<2	<2	NR
	D	5/31/88	570	7,670	638000	<30	**12**	<2	<2	NR
	D	6/29/88	460	8,040	648000	<30	**175**	<2	<2	<40
	D	11/8/89	244	7,281	587000	<40	6.1	<5	<4	**50**
	D*	9/2/94	40	6,550	474000	NR	7	0.1	6	1
	D*	3/16/95	54	6,180	457000	NR	**30**	0.2	4	1
	D*	7/25/97	247	10,900	507000	20.4	**23**	0.093	2.6	1.1
	D*	6/17/98	113	8,600	527000	25.6	**10.4**	0.042	2.6	0.773
	D*	6/17/98Dup	100	8,420	517000	20.7	**156**	0.055	2.65	1.2
Tech 1 S14, CACAA	D	7/19/90	210	521	392000	74	2.7	<5	8	NR
	D	4/20/00	<50	47	317000	<30	1.69	<2	<2	<2
	D	5/6/03	108	163	278000	<30	1.7	<1	6.46	2.38
Butte Supply S14, ACDC	D	6/19/90	131	31	12700	131	0.7	<5	11	<50
Green Lake Seep S15, DDB	D*	7/27/83	8	1000	317000	<30	2.3	<2	11	<40
	T*	7/21/94	206	3530	530000	NR	8	0.1	<5	9
	D	8/26/94	80	2610	600000	<30	1.7	<2	2.3	2.1
	D	12/28/94	233	4200	550000	<30	2.8	**7.5**	20.4	2
	T	12/28/94	532	4400	NR	97.9	2.2	**13.1**	29.1	8.5
	T*	12/28/94	613	4060	552000	NR	5	0.4	3	**20**
	T*	3/27/95	509	4560	606000	NR	4	0.2	<2	5
	T*	9/29/95	552	5520	693000	NR	3	0.1	5	12
	T*	12/28/95	1540	5800	611000	NR	7	0.3	2	**50**
	T*	1/30/96	819	5760	455000	NR	2	<0.1	<3	10
	T*	2/29/96	1420	5800	534000	NR	5	0.3	7	4.1
	T*	3/29/96	764	5410	NR	NR	3	<0.1	3	10
	T*	4/29/96	901	5480	552000	NR	2	<0.1	6	10
	T*	6/28/96	294	4700	447000	NR	3	0.1	<4	3
	T*	7/31/96	1700	5,910	546000	NR	6	0.3	4	**55**
	*	6/22/98	411	3560	547000	16.6	1.2	0.17	4.7	0.77
	D*	7/2/01	1.30	0.62	NA	18.9	2.38	0.049	**189000**	**43.2**
	T*	7/2/01	392.00	4130	442730	50.9	1.42	0.049	2.55	13.25
	D	4/18/03	148	2880	463900	<150	<5	<1	<10	<10
	D	11/6/03	71	2960	445000	<30	<5	<1	<5	<10
	D	4/26/04	526	4030	420000	<30	1.78	<1	<2	<2
EPA MCL[1]							10	5	1300	15
EPA SMCL[2]			300	50	250000	50-200				

[1] U.S. Environmental Protection Agency maximum contaminant level or action level; revised October 13, 1999.

[2] U.S. Environmental Protection Agency secondary maximum contaminant level; non-enforceable standards based on cosmetic or aesthetic affects such as discoloring skin or teeth and affecting the taste, odor, and color of the water.

* =Samples collected ARCO; Those without were collected by Montana Bureau of Mines and Geology

T =Total Recoverable Metals Analysis

D =Dissolved Metals Analysis

Note : Samples represent data available at time of assessment.